

What is claimed is:

1. A pattern recognition apparatus for recognizing a pattern based on a value of a probability density
5 function defined for each category in a feature vector space of a pattern, comprising:
a calculation device calculating a value of a discriminant function of a specific category for a feature vector of an unknown pattern when a set of
10 difference vectors is generated by calculating a difference between a feature vector of each pattern in a specific pattern set and an average feature vector of each correct category, an expected value of a probability density function of the specific category
15 is defined using a normal distribution with an autocorrelation matrix of the set of difference vectors and the feature vector of the unknown pattern as a covariance matrix and an average, respectively, as a probability density function and the discriminant
20 function is defined based on the expected value; and
a recognition device recognizing the unknown pattern based on the value of the discriminant function and outputting a recognition result.
- 25 2. The pattern recognition apparatus according to

claim 1, further comprising

a storage device storing both information about eigenvalues and eigenvectors of a covariance matrix of a fluctuating distribution of the category and information about eigenvalues and eigenvectors of a covariance matrix of the normal distribution,

wherein said calculation device calculates the value of the discriminant function using the information stored in the storage device.

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3. A pattern recognition apparatus for recognizing a character based on a value of a probability density function defined for each category in a feature vector space of a character pattern, comprising:

15 a calculation device calculating a value of a discriminant function of a specific category for a feature vector of an unknown pattern of a specific font when a set of difference vectors is generated by calculating a difference between a feature vector of each character pattern in a character pattern set of the specific font and an average feature vector of each correct category, an expected value of a probability density function of the specific category is defined using a normal distribution with an autocorrelation
20 matrix of the set of difference vectors and the feature
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vector of the unknown pattern as a covariance matrix and an average, respectively, as a probability density function and the discriminant function is defined based on the expected value; and

- 5 a recognition device recognizing the unknown pattern based on the value of the discriminant function and outputting a recognition result.

4. A pattern recognition apparatus for recognizing
10 a character based on a value of a probability density function defined for each category in a feature vector space of a character pattern, comprising:

- a calculation device calculating a value of a discriminant function of a specific category for a
15 feature vector of an unknown pattern inputted by specific input equipment when a set of difference vectors is generated by calculating a difference between a feature vector of each character pattern in a character pattern set, which is inputted by the specific input equipment,
20 and an average feature vector of each correct category, an expected value of a probability density function of the specific category is defined using a normal distribution with an autocorrelation matrix of the set of difference vectors and the feature vector of the
25 unknown pattern as a covariance matrix and an average,

respectively, as a probability density function and the discriminant function is defined based on the expected value; and

- 5 a recognition device recognizing the unknown pattern based on the value of the discriminant function and outputting a recognition result.

5. A pattern recognition apparatus for recognizing a character based on a value of a probability density
10 function defined for each category in a feature vector space of a character pattern, comprising:

- a calculation device calculating a value of a discriminant function of a specific category for a feature vector of an unknown pattern inputted with
15 specific resolution when a set of difference vectors is generated by calculating a difference between a feature vector of each character pattern in a character pattern set, which is inputted with the specific resolution, and an average feature vector of each correct
20 category, an expected value of a probability density function of the specific category is defined using a normal distribution with an autocorrelation matrix of the set of difference vectors and the feature vector of the unknown pattern as a covariance matrix and an
25 average, respectively, as a probability density function

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and the discriminant function is defined based on the expected value; and

- a recognition device recognizing the unknown pattern based on the value of the discriminant function and outputting a recognition result.

6. A pattern recognition apparatus for recognizing a character based on a value of a probability density function defined for each category in a feature vector space of a character pattern, comprising:

- a calculation device calculating a value of a discriminant function of a specific category for a feature vector of an unknown pattern when a set D_{SF} of difference vectors is generated by calculating a difference between a feature vector of each character pattern in a character pattern set of a specific font F and an average feature vector of each correct category, a set D_{SI} of difference vectors is generated by calculating a difference between a feature vector of each character pattern in a character pattern set, which is inputted by specific input equipment I , and an average feature vector of each correct category, a set D_{SR} of difference vectors is generated by calculating a difference between a feature vector of each character pattern in a character pattern set, which is inputted with specific resolution

R, and an average feature vector of each correct category, an expected value f_1 of a probability density function f_0 of the specific category is defined at each point in the feature vector space using a normal distribution function with a autocorrelation matrix of the set D_{SF} as a covariance matrix, as a probability density function, an expected value f_2 of the expected value f_1 is defined at each point using a normal distribution with a autocorrelation matrix of the set D_{SI} as a covariance matrix, as a probability density function, an expected value f_3 of the expected value f_2 is defined at each point using a normal distribution with a autocorrelation matrix of the set D_{SR} as a covariance matrix, as a probability density function, and the discriminant function is defined based on the expected value f_3 ; and

a recognition device recognizing the unknown pattern based on the value of the discriminant function and outputting a recognition result.

7. A pattern recognition apparatus for recognizing a character based on a value of a probability density function defined for each category in a feature vector space of a character pattern, comprising:

a calculation device calculating a value of a discriminant function of a specific category for a

feature vector of a target character pattern included in an input document when a set of difference vectors is generated by calculating a difference between a feature vector of each character pattern in a set of character patterns, which are included in the input document and for which the maximum value of a probability density function of a category is larger than a threshold value, and an average feature vector of each correct category, an expected value of a probability density function of the specific category is defined using a normal distribution with a autocorrelation matrix of the set of difference vectors and the feature vector of the target character pattern as a covariance matrix and an average, respectively, as a probability density function, and the discriminant function is defined based on the expected value; and

a recognition device recognizing the unknown pattern based on the value of the discriminant function and outputting a recognition result.

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8. A computer-readable storage medium which records a program for enabling a computer to recognize a pattern based on a value of a probability density function that is defined for each category in a feature vector space of a pattern, the program enabling the computer to

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perform:

- calculating a value of a discriminant function of
a specific category for a feature vector of an unknown
pattern when a set of difference vectors is generated
5 by calculating a difference between a feature vector
of each pattern in a specific pattern set and an average
feature vector of each correct category, an expected
value of a probability density function of the specific
category is defined using a normal distribution with
10 an autocorrelation matrix of the set of difference
vectors and the feature vector of the unknown pattern
as a covariance matrix and an average, respectively,
as a probability density function and the discriminant
function is defined based on the expected value;
15 recognizing the unknown pattern based on the value
of the discriminant function; and
outputting a recognition result.

9. A propagation signal which propagates a program
20 for enabling a computer to recognize a pattern based
on a value of a probability density function that is
defined for each category in a feature vector space of
a pattern, the program enabling the computer to perform:
calculating a value of a discriminant function of
25 a specific category for a feature vector of an unknown

pattern when a set of difference vectors is generated by calculating a difference between a feature vector of each pattern in a specific pattern set and an average feature vector of each correct category, an expected value of a probability density function of the specific category is defined using a normal distribution with an autocorrelation matrix of the set of difference vectors and the feature vector of the unknown pattern as a covariance matrix and an average, respectively, as a probability density function and the discriminant function is defined based on the expected value;
recognizing the unknown pattern based on the value of the discriminant function; and
outputting a recognition result.

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10. A pattern recognition method for recognizing a pattern based on a value of a probability density function defined for each category in a feature vector space of a pattern, comprising:

20 generating a set of difference vectors by calculating a difference between a feature vector of each pattern in a specific pattern set and an average feature vector of each correct category;
obtaining an expected value of a probability
25 density function of a specific category using a normal

distribution with a autocorrelation matrix of the set of difference vectors and a feature vector of an unknown pattern as a covariance matrix and an average, respectively, as a probability density function;

5 obtaining a discriminant function of the specific category based on the expected value;

 calculating a value of the discriminant function for the feature vector of the unknown pattern; and

 recognizing the unknown pattern based on the value
10 of the discriminant function.

11. A pattern recognition apparatus for recognizing a pattern based on a value of a probability density function defined for each category in a feature vector
15 space of a pattern, comprising:

 calculation means for calculating a value of a discriminant function of a specific category for a feature vector of an unknown pattern when a set of difference vectors is generated by calculating a
20 difference between a feature vector of each pattern in a specific pattern set and an average feature vector of each correct category, an expected value of a probability density function of the specific category is defined using a normal distribution with an
25 autocorrelation matrix of the set of difference vectors

and the feature vector of the unknown pattern as a covariance matrix and an average, respectively, as a probability density function and the discriminant function is defined based on the expected value; and

- 5 recognition means for recognizing the unknown pattern based on the value of the discriminant function and outputting a recognition result.